Supplementary Information

Self-assembled foam-like graphene networks formed by nucleate boiling

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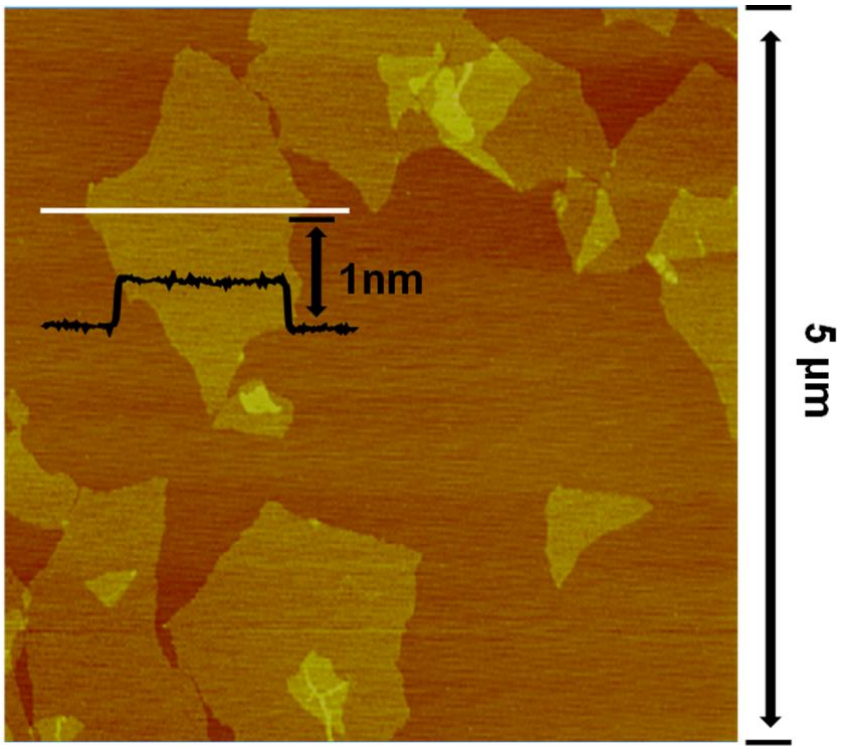
Contents



Supplementary Figure S1 | AFM image of RGO

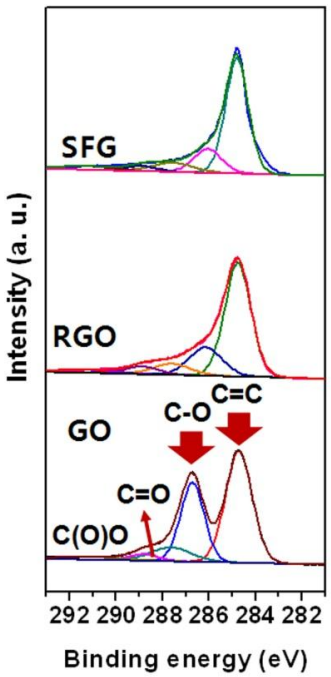
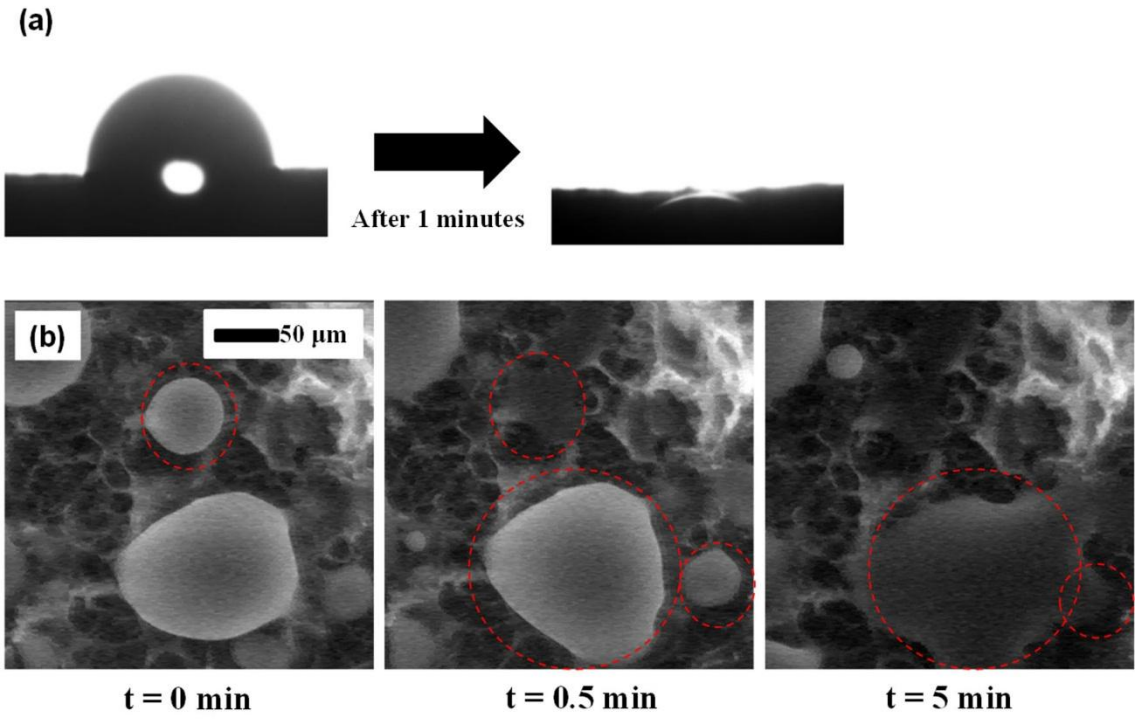


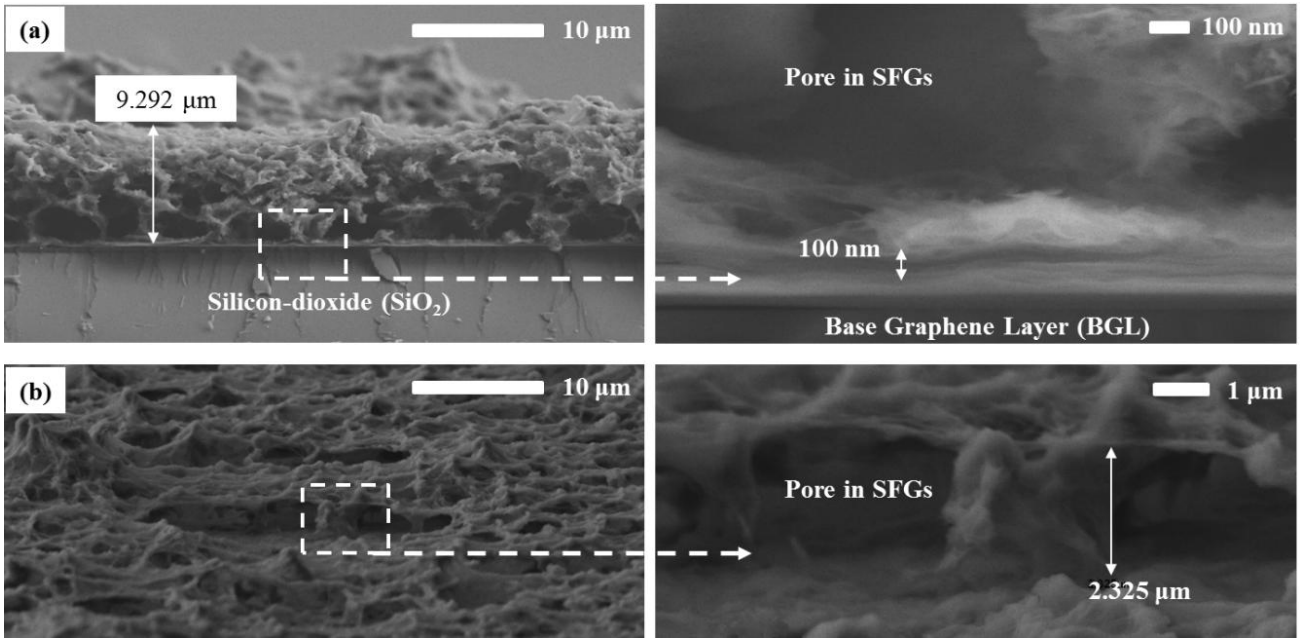
Table S1. XPS peak deconvolution

	GO (%)	RGO (%)	SFG (%)
C-C	50.9	61.9	64.9
C-O	32.1	19.8	16.9
C=O	10.1	8.9	9.2
C(O)O	3.5	5.4	3.9
$\frac{(C-C)+(C=C)}{(C-O)+(C=O)+C(O)O}$	1.1	1.8	2.1

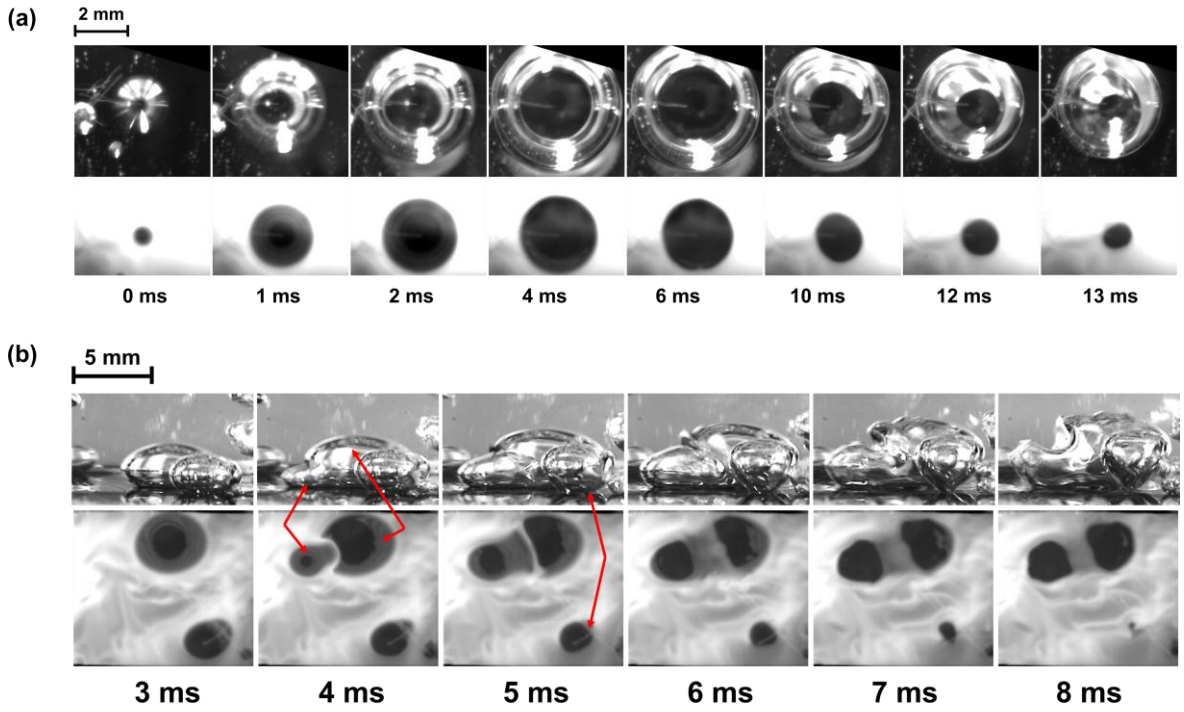
Supplementary Figure S2 | XPS peak deconvolution of GO, RGO and SFG



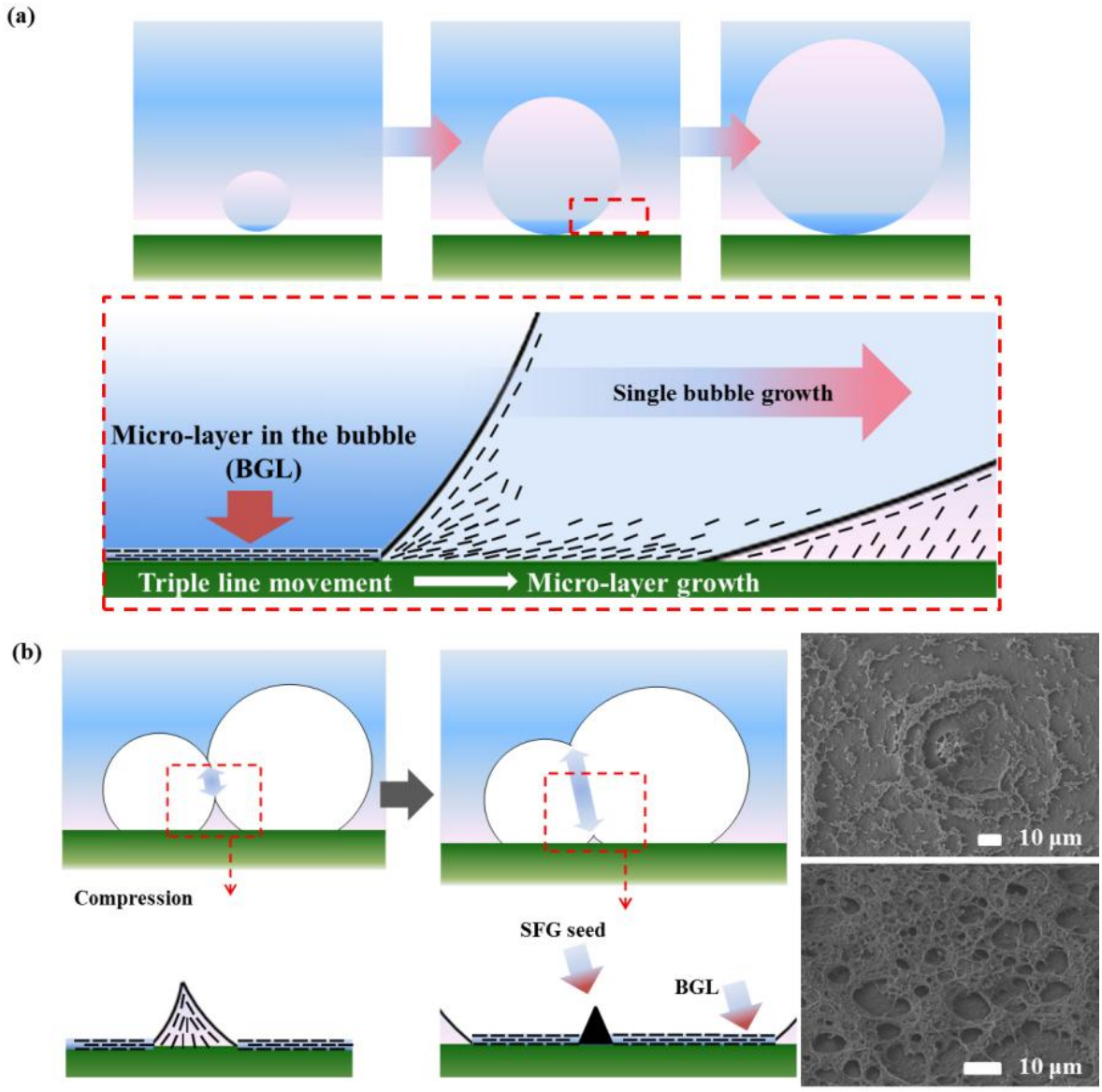
Supplementary Figure S3 | Surface wettability test on SFG (a) Contact angle measurement : When a 10 μL water droplet was loaded, it was absorbed into the pores of SFGs. (b) The dynamic observation of water droplet absorption into the SFG using E-SEM under the 30 ℃ and 0.6 bar. Water droplets were suddenly absorbed (see the red-dot circle).



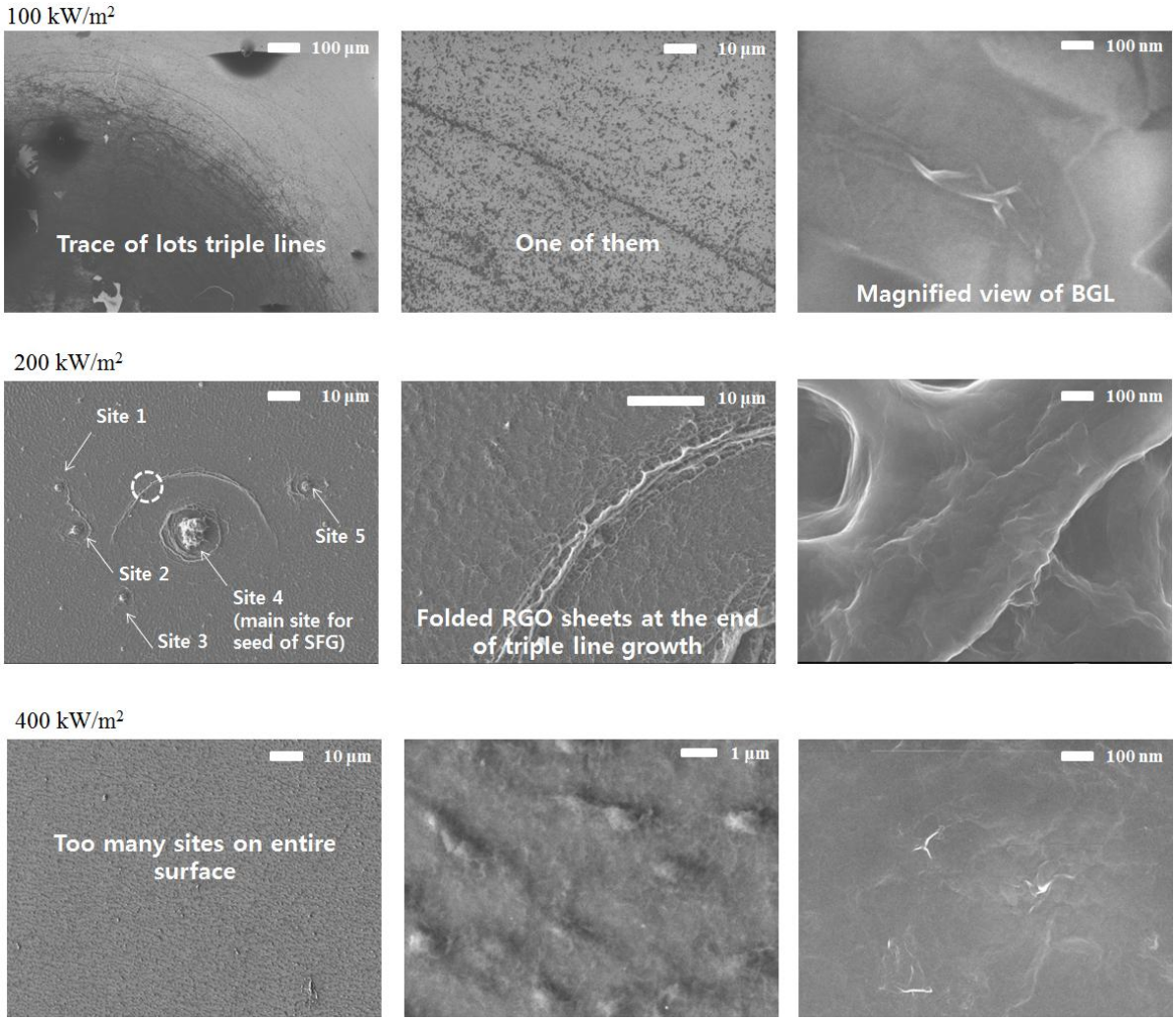
Supplementary Figure S4 | Side-view HRSEM image of the 3-D SFG structure. (a) The thickness of SFG film and BGL. (b) The pore size of SFG film (25° tilt view).



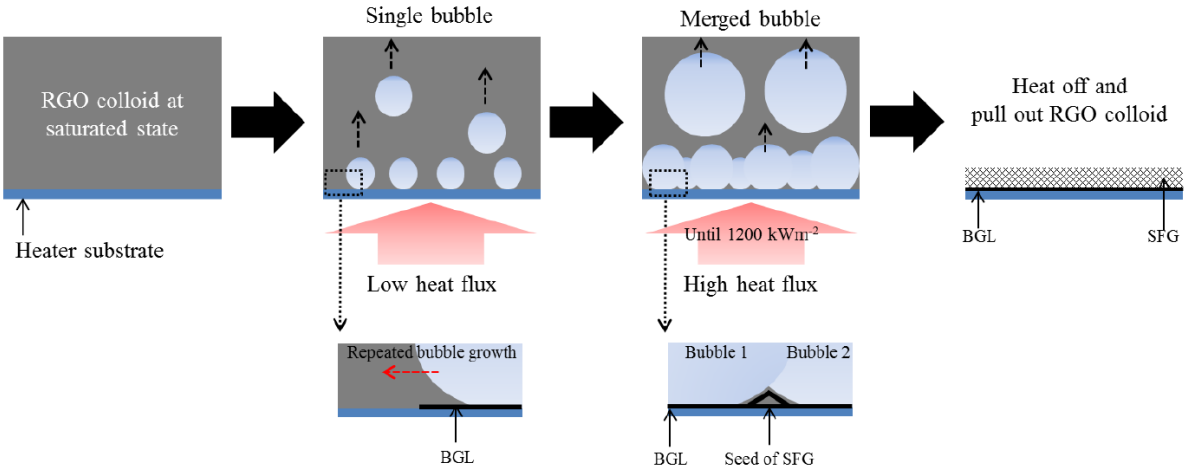
Supplementary Figure S5 | High speed visualization and infrared radiography of bubble generation, growth, and departure (a) Triple line movement of the single bubble. (Black circle of 2nd row images shows the triple line movement.) (b) Local vacancy during the bubbles coalescence. (white line between black circles)



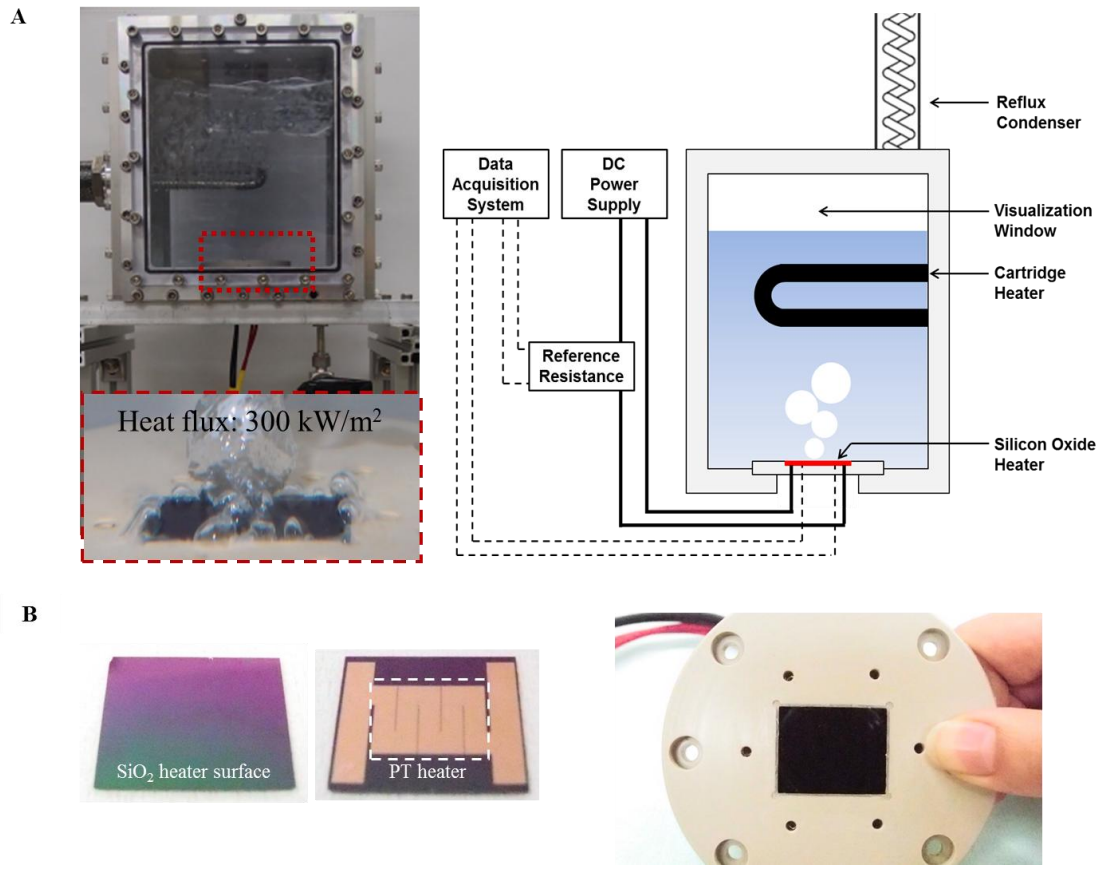
Supplementary Figure 6 | A proposed mechanism of the SFG structure formation. (a) Mechanism of the BGL structure formation. (b) Mechanism of SFG seed formation.



Supplementary Figure 7 | An experimental evidence of BGL and SFG formation mechanism. Observation of BGL and SFG formation process, which supports the proposed mechanism discussed in the text.



Supplementary Figure 8 | A simple schematic of SFG preparation process.



Supplementary Figure 9 | A nucleate boiling experimental facility. (a) The boiling experimental facility and a picture of bubbles formation on the silicon. (b) Silicon-dioxide heater with 25 x 20 mm. The backside of the heater was patterned with Pt material for the electrical joule heating.

Supplementary Table 2 | Raman parameters of GO, RGO and SFG

Sample	Raman parameters		
	I_D	I_G	I_D/I_G
GO	0.88	1	0.88
RGO	1	0.86	1.16
SFG	1	0.70	1.43